U.S. ENVIRONMENTAL PROTECTION AGENCY
POLLUTION REPORT

Date: February 27, 2004
From: David Dorian, On-Scene Coordinator, USEPA Region IV
Subject: Starmet CMI, Inc. , Barnwell County, Barnwell, S.C.
To: Shane Hitchcock, Branch Chief, Emergency Response and Removal Branch
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POLREP No.: POLREP #11 (eleven)

I. BACKGROUND

Site #: A48Q
EPA ID #: SCD987570405
A street address: 365 Metal Drive
Cities, counties, state: Barnwell, Barnwell County, S.C.
NPL Status: Not listed.
State Notification: Site was referred to EPA by SCDHEC

II. SITE INFORMATION

A. Incident Category

Starmet CMI, Inc.(Starmet), converted uranium hexaflouride (UF6) to a more stable material, uranium tetraflouride (UF4); reduced a portion of this UF4 to uranium metal for sale; and re-plated uranium counterweights. On June 17, 2002, The South Carolina Department of Environmental Control (DHEC) issued an Emergency and Administrative Order, which required the facility to cease operations. The site posed an imminent threat to public health for the following reasons:

- Two compromised retention ponds containing approximately 550,000 gallons of uranium contaminated wastewater in excess of 250,000 pCi/L (compared to a maximum release standard of 300 pCi/L).
- Drums of pyrophoric uranium metal shavings.
- Vats of plating acids.
- Approximately 18,000 drums of radioactive material stored without the operation of the facility's ventilation and fire suppression systems.
- Radiation dose at the fence line in excess of regulatory limits for public exposure.
- Significant radiation doses emanating from metals believed to be decommissioned parts of commercial reactors.

The Emergency Response and Removal Branch (ERRB) initiated an emergency removal action at Starmet ("Site") on June 24, 2002, to prevent the release of depleted uranium from the wastewater retention ponds behind the facility and to mitigate other risks posed by hazardous materials on site. U_{238} is listed in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as a hazardous substance. The pond liners were in poor condition and there were indications that the liner system was failing. At the time of the initial response, the ponds were in danger of overflowing due to heavy rains. EPA treated the wastewater with by heat induced evaporation followed by solidification of the wastewater brine. The solids were disposed of in the Envirocare Landfill in Clive, Utah. Extensive work is work is required to remove the large quantities of radioactive materials remaining from Starmet operations. As a result, th Site continues to meet the emergency exemption of CERCLA section 104(c)(1)(A) and the criteria for continued response under Section 300.415(b) of the National Contingency Plan (NCP).

B. Site Description

1. Site location

The site is located at 365 Metal Drive, Barnwell, South Carolina. The property surrounding the site is planted in pine trees. The nearest residential property is 2 miles from the site. The town of Barnwell is approximately 8 miles from the site on well paved roads. The facility consists of two large steel-framed buildings and the former ponds. Both of the buildings are surrounded by chain linked fences in good repair.

2. Description of threat

Starmet currently has approximately 12,130 drums of UF_4 stored on site. Currently radioactive dose rate emanating at the fence line is in excess of Nuclear Regulatory Standards. The UF_4 is assumed to be the source of the activity. The radioactive dose rates in the Starmet facility are as high as 10 millirem per hour. The facility also has an estimated 4,300 drums of calcium flouride and 116 drums of magnesium fluoride. These are all low level radioactive waste material stored on site. In addition to the filled drums of UF_4, approximately 115 tons of cut 55-gallons drums, stored in B-25 boxes, contaminated with UF_4 residue remain on site. Adjacent to the B-25 boxes are 6 SeaLand boxes filled with radioactive debris, and at least three drums of solvent, believed to be mixed wastes. Approximately 1500 drums and un characterized quantities of loose dry active waste (DAW) is also part of the processing legacy. Additionally, Starmet received radioactive metals for its metal reclamation ("metal melt") process, and tons of this radioactive metal remains on site.

The conversion of UF6 to UF4 creates hydrogen flouride (HF), which in turn is neutralized with lime to form calcium fluoride(CaF). Both these byproducts remain on site and may be radioactive from uranium entering the HF tower. During its operational history, Starmet used some of the UF4 in the manufacture of uranium metal "derbies" which were shipped to Nuclear Metals, Concord, Massachusetts to be processed into materials used in national defense (Nuclear Metals is no longer operating and became a listed Superfund site (Site # 0100550) as of

June 14, 2001). Starmet reduced the UF_4 with magnesium, and the resulting magnesium flouride (MgF_2) is a waste product that remains on site.

Starmet re-plated uranium counterweights for the aircraft industry and the defense department. From this process, Starmet generated spent plating solutions which contained cadmium, nickel, and cyanide. A radioactive cyanide plating bath and rinse solution remain on site from the facility's counterweight replating.

Many of the drums inside the building have deteriorated from excessive weight, the pressure of other stacked drums above them, and chemical corrosion. Some drums have already failed, and leaking UF4 and uranium contaminated substances are visible. The drums contain dispersible radioactive powder, weigh between 1,600 and 2000 lbs., and are stacked three high. As the condition of the drums becomes more precarious, the risk to clean up workers increases significantly, in terms of both radiological and physical hazards. UF4 is primarily an alpha emitter and, if breathed, creates a permanent source of internal radiation. Risk of damage to internal organs is then significant. The activity of the UF4 on site has been measured as high as 350,000 pCi/g. South Carolina's limit for release into water is 300 pCi/L. As water continues to infiltrate the building, the risk of a release of radioactive storm water grows.

The roof is in poor repair and eventually the combination of rain water mixed with uranium would create a radioactive storm water runoff, spreading contamination to surrounding soils and receiving waters. EPA currently maintains site security and the facility's fire suppression system. A fire is potentially catastrophic and the only long-term solution to preventing it at this point is to dispose of the radioactive material on site.

Starmet had the power to the facility shut off on July 26, 2002, allowing UF4 dust and plating vat fumes to accumulate in the buildings. The facility is abandoned, other than EPA activity. Were it not for EPA's maintenance of the facility's ventilation system, radon gas (a daughter product of uranium) would accumulate beyond regulatory standards.

C. Preliminary Assessment/Site Inspection Results

There are more than 16,500 drums of radioactive material and 115 tons of UF4 stored in B-25 boxes, in addition to other hazardous materials stored at this facility. Prior to EPA's arrival, there was no one at the facility to maintain the ventilation system or fire suppression system.

III. RESPONSE INFORMATION

A. Current Situation

Effective February 13, 2004, EPA entered into a multiparty Administrative Order on Consent (AOC) with the United States Enrichment Corporation (USEC), the Department of Energy (DOE), and the Department of the Army to complete the time critical removal at the Starmet site. Under the terms of the AOC, USEC will conduct a PRP-lead removal for all waste materials associated with the conversion of USEC uranium hexafluoride to uranium tetrafluoride

(UF4). Materials to be removed include approximately 5,700 drums of UF4, 3,600 drums of calcium fluoride (with radioactive residual), hydrogen fluoride, and associated dry active waste. The USEC portion of the removal accounts for approximately 38% of the total removal, and EPA has estimated the cost at approximately $8.5 million. Concurrently, EPA will conduct a fund-lead removal, financed by a special account established by DOE/the Army (through the United States Judgement Fund). The account will initially be funded with $15 million and has provisions for additional funding, if necessary. EPA will remove 6,200 drums of UF4 and hundreds of tons of radioactive waste metals, and other radioactive waste materials associated with production of uranium metal under DOE and Army contracts.

The following tasks were completed on site from January 6, 2004 to February 27, 2004:

1. The T-1 sump in the Reduction Building was pumped out. 2,201 gallons of wastewater were treated in the on site evaporative units. The brine was solidified with polyacrylate in a 20 cubic yard rolloff, which has been staged for removal. The solids were characterized for disposal.
2. The sludge remaining in T-1 was removed and desiccated in the facility's burn out ovens. The dried sludge was consolidated. The sump was then cleaned and inspected for cracks. The sump was in good repair.
3. The Health Physics staff performed gross decontamination on the atomizer room in the Reduction Building to permit work around the T-1 and T-2 sumps.
4. ERRS contractor performed maintenance on the evaporator system waste water treatment tank so it could accept the liquids from T-1 and T-2 sumps.
5. A power outage damaged the facility fire suppression system. The shorted motor and blown fuses were replaced.
6. Radiation Safety Officer (RSO) completed radiological survey of Radiological Control Area(RCA) at Southwest corner of the DU Center. No dose rate was detected, and RSO able to clear area.
7. ERRS contractor developed a work plan for the removal of the approximately 6000 DOE UF4 drums in the DU Center. The drums will be staged in 100-ton segments that correspond to gondola shipments.
8. ERRS contractor prepared staging areas for pre-shipment storage of UF4.
9. ERRS contractor prepare the DU center for the packaging of drums into soft sided, strong tight containers (e.g., "super sacks"). These containers are constructed of woven poly propylene with an internal liner and have a 6000-lb capacity. Preparation of the building included installation of air lines and establishing clean zone.
10. START contractor developed and implemented confirmatory sampling plan for disposal of DOE UF4 in DU Center. Four drums from every gondola load (approximately 100 drums) were composited and sampled for alpha spec uranium and plutonium to ensure consistency with the waste profile developed for disposal.
11. ERRS contractor lifted drums of DOE UF4 from the stacks, weighed them, and secured them in the super sacks. The super sacks were surveyed, staged, and covered with plastic sheeting prior to shipment offsite to the Envirocare Landfill. This is now an ongoing process. To date, 376 drums have been staged in 168 super sacks.
12. A severe ice storm on 1/26/04 interrupted site activities for two and a half days.
13. The data from the original oxidation of the cyanide (nitric acid) plating bath and rinse

tank indicated that the cyanide was not completely destroyed. Therefore oxidation with hydrochloric acid (6% bleach solution) continued. ERRS contractor and OSC conducted the work in Level B protection and maintained pH above 12. ERRS contractor broke up the cake which had formed on the bottoms with a motorized mixer. Solution was re-sampled and sent to laboratory for analysis.

14. Sump T-1 refilled with water from facility plumbing and laundry. The wastewater measured 1522 pCi/L, above the 30 pCi/L limit for discharge to a POTW. ERRS contractor commenced draining sump and treating it in on site evaporative waste water treatment facility.

15. OSC met on site with USEC contractors for scoping meeting as required by AOC, effective February 13, 2004.

16. OSC met on site with USEC contractors to discuss requirements for Radiological Protection Plan and Health and Safety Plan.

17. General Radiation Safety activities during this period included wipe samples of all traversed areas, regular air monitoring and maintaining the plant air HEPA filtration system. ERRS contractor repaired and calibrated meters and personal air monitors.

B. Next Steps

1. Packaging, staging and confirmatory sampling of the approximately 6,000 drums of DOE UF4 will continue.

2. Portions of the Reduction Floor needs to be cleared to improve housekeeping and facilitate access for USEC's contractors. The ERRS contractor will construct a drum crusher, crush drums, remove debris, and consolidate waste.

3. T-1 will be pumped out and the wastewater treated in the on site evaporative system. The brine will be solidified with polyacrylate. The solids will be sent offsite for disposal.

4. Once drained, T-1 will be cleaned again and painted. The objective is to limit contamination of wastewater that collects in the sump to limits acceptable to a POTW. Sending the accumulated liquids to a POTW would be more economical than on site evaporation.

5. ERRS contractor will begin subcontract negotiations for transportation and disposal of the radioactive material on site. Subcontracts will need contracting officer approval.

6. The data from the oxidation of the cyanide plating bath solutions will be analyzed.